

# *The Scale of Discovery* Educator Workshops

## ***The Scale of Discovery: Rulers, Clocks, and Models***

### ***Far In, Far Out: MESSENGER***

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# Why Mercury? Why Now?

- The MESSENGER team posed these questions (and their answers) in 1996

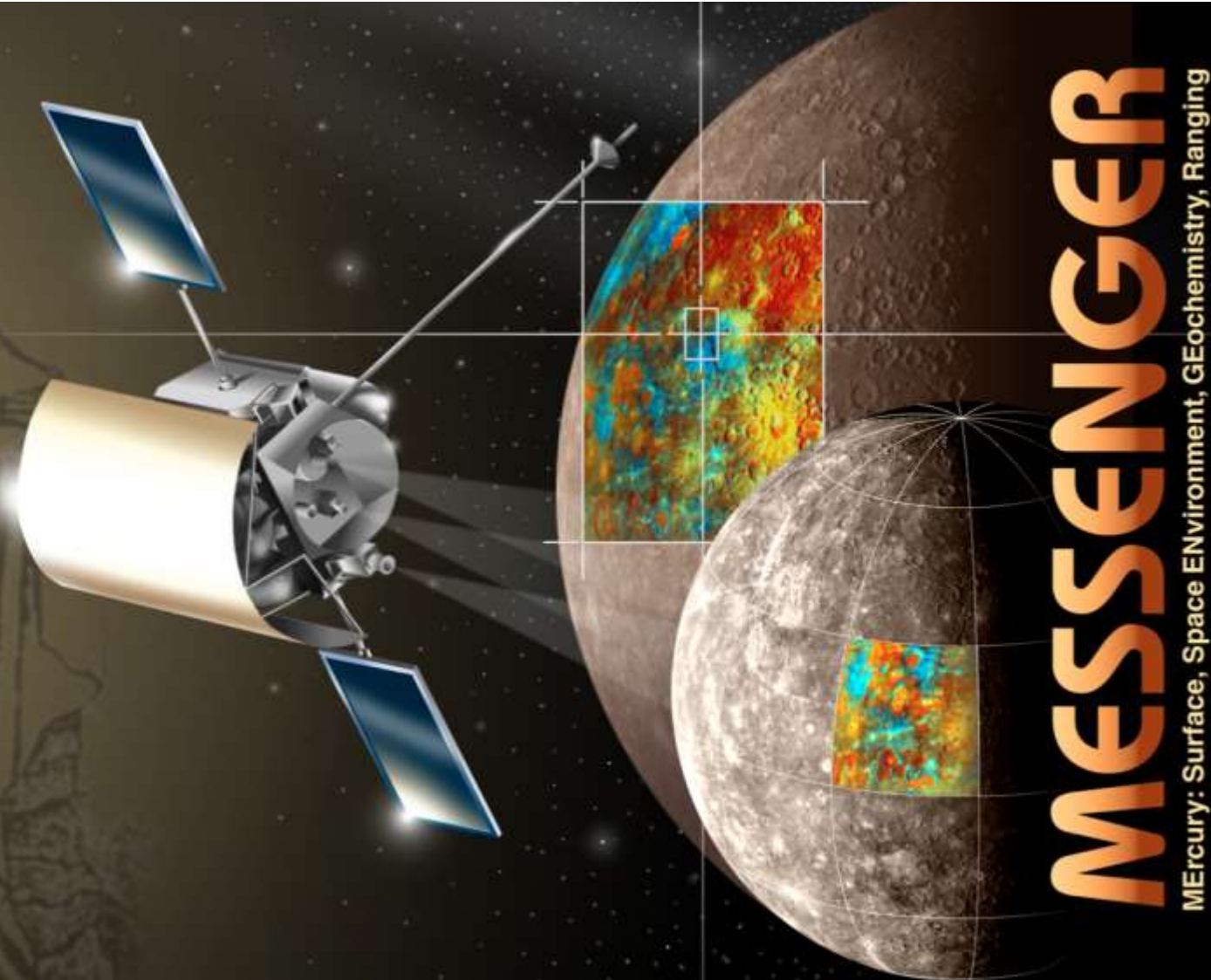
## WHY MERCURY?

Understanding Mercury, and the forces that have shaped it, is fundamental to understanding the terrestrial planets and their evolution.

Our goal is to gain new insight into the formation and evolution of planetary systems.

## WHY NOW?

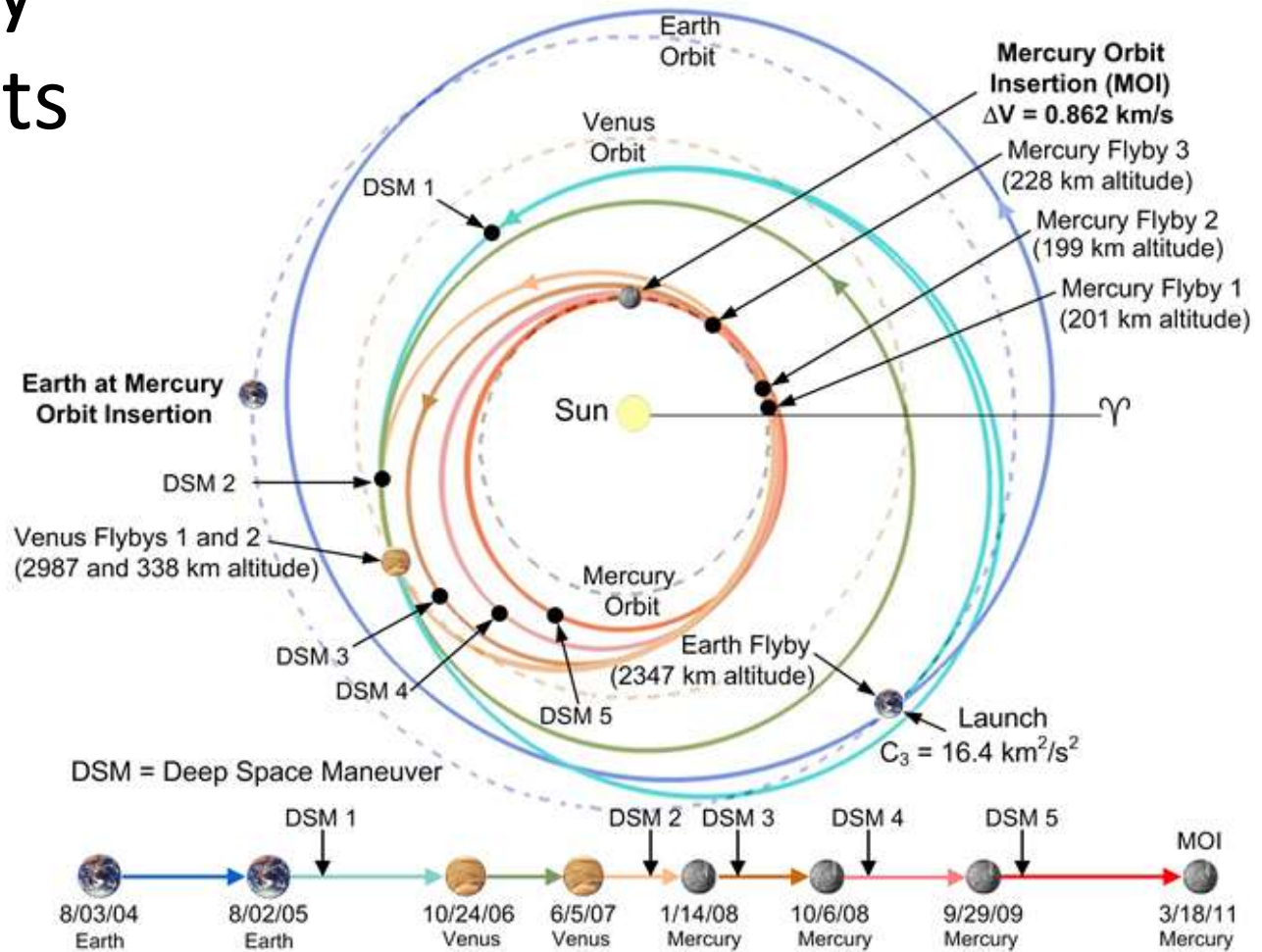
- An orbital mission to Mercury is long overdue.
- MESSENGER provides a robust, simple design optimized to provide world-class science from a Discovery mission.
- MESSENGER launches in 2004, the most favorable launch window for a decade.





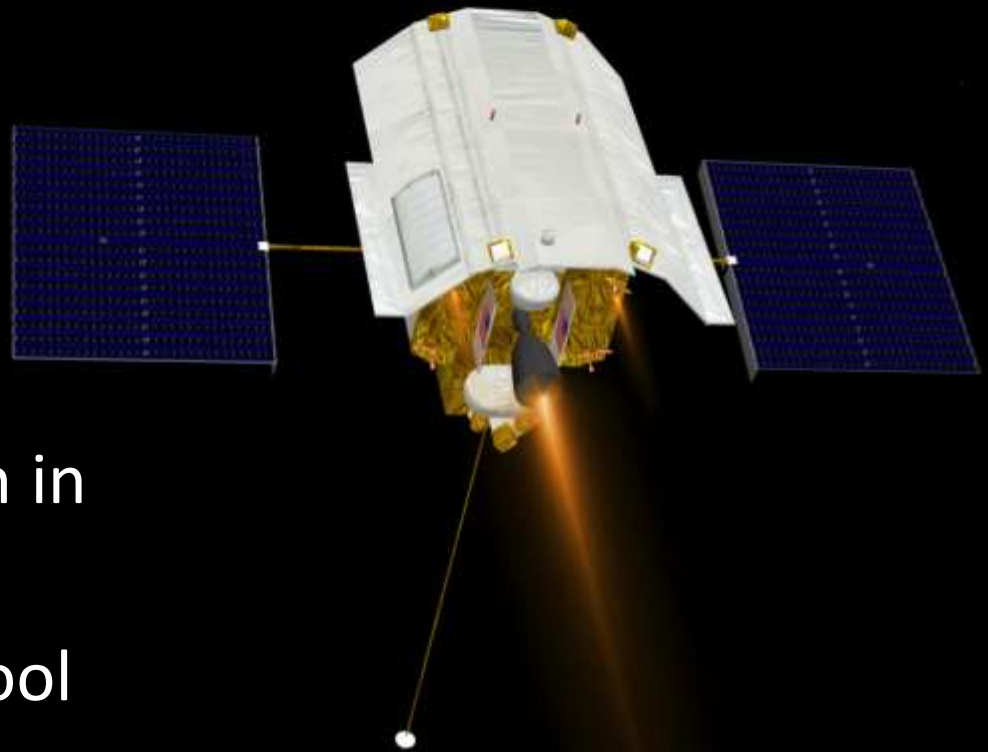
# MESSENGER Trajectory

- Six planetary gravity assists
- Half of spacecraft mass was propellant
- A 6.5-year flight



# *A Mission of Firsts*

- Orbit Mercury
- Solar sailing for trajectory correction
- Phased-array antenna for
- Sunshade design
- Solar panel design
- Fuel tank design
- Longest laser transmission in space
- SciBox mission planning tool



# *Uncovering Mercury's Secrets: Volcanism*

- Flood and explosive volcanism were widespread early in Mercury's history





# *Uncovering Mercury's Secrets: Hollows*

- “Hollows” – depressions in bright deposits within impact craters – are found widely on Mercury



# *Uncovering Mercury's Secrets: Water Ice*



- Compelling support for abundant water ice and other frozen volatile materials in permanently shadowed polar craters



# ***MESSENGER Has Revealed a New World***

- Planetary exploration is all about ‘the undiscovered country’
- Mercury is the ‘end member’ of the terrestrial planets – of which our home world is one
  - Provided the first full maps of Mercury
  - Discovered Mercury’s elemental composition
  - Revealed planetary geology features known of nowhere else in the solar system
  - Probed the magnetic field of the only other magnetized planet like Earth
- Because of MESSENGER we know better the past violence of the inner solar system – and how unique Earth is and what may have shaped the world we now live in





# The Bottom Line



***“We shall not cease  
from exploration, and  
the end of all our  
exploring will be to  
arrive where we  
started and know the  
place for the first time.”  
- T.S. Eliot***